



THE WEIZMANN SCIENCE PRESS OF ISRAEL

National Council for Research and Development

ISRAEL Journal of BOTANY

Volume 25
1976



מוסד ויצמן לפרסומים במדעי הטבע ובטכנולוגיה, ירושלים
THE WEIZMANN SCIENCE PRESS OF ISRAEL

Publishers of the following journals

ISRAEL JOURNAL OF BOTANY; ISRAEL JOURNAL OF CHEMISTRY;
ISRAEL JOURNAL OF EARTH-SCIENCES; ISRAEL JOURNAL OF MATHEMATICS;
ISRAEL JOURNAL OF TECHNOLOGY; ISRAEL JOURNAL OF ZOOLOGY;
JOURNAL D'ANALYSE MATHÉMATIQUE

לרשת מדע לנוער המתבגר (SCIENCE FOR YOUTH)

בצע עתון מדעי לכל (SCIENCE)

Supporting Institutions

THE NATIONAL COUNCIL FOR RESEARCH AND DEVELOPMENT;
BAR-ILAN UNIVERSITY; BEN GURION UNIVERSITY OF THE NEGEV;
TECHNION—ISRAEL INSTITUTE OF TECHNOLOGY; TEL AVIV UNIVERSITY;
THE HEBREW UNIVERSITY OF JERUSALEM; THE WEIZMANN INSTITUTE OF SCIENCE

GENERAL EDITORIAL BOARD

D. ABIR
I. ARNON
A. DVORETZKY
H. EYAL-GILADI
H. HANANI
M. JAMMER
J. JORTNER
E. KATCHALSKI-KATZIR
N. SHARON

G. STEIN

Y. WEILER

Executive Editor

L. LESTER

Assistant Editor

ESME GORDON

**ISRAEL JOURNAL
OF BOTANY**

Formerly Bulletin of the Research
Council of Israel, Section D

Editorial Board

LEONORA REINHOLD *Editor-in-chief*

D. ATSMON

B. L. EPEL

NAOMI FEINBRUN

CHAIA C. HEYN

M. LITAV

G. ORSHAN

J. PALTÍ

A. E. RICHMOND

Coordinator

M. NEGBI

Subscriptions are to be addressed to the Weizmann Science Press of Israel, P.O.B. 801, Jerusalem 91000, Israel. In Europe, orders may be sent to Wm. Dawson & Sons Ltd., Cannon House, Macklin Street, London, W.C.2., or to booksellers. Subscription fees per volume, \$ 25.00.

Copyright © 1976 by THE WEIZMANN SCIENCE PRESS OF ISRAEL

Printed in Israel 1976
Mercaz Press, Jerusalem

ISRAEL JOURNAL OF BOTANY

VOLUME 25, 1976

TABLE OF CONTENTS

Numbers 1-2

PLANT PHYSIOLOGY AND ANATOMY

Development of plants in filtered sunlight. I. Spectral composition, light intensity and other experimental conditions	<i>A. Kadman-Zahavi, E. Alvarez-Vega and E. Ephrat</i>	1
Development of plants in filtered sunlight. II. Effects of spectral composition, light intensity, daylength and red and far-red irradiations on long- and short-day grasses	<i>A. Kadman-Zahavi and E. Ephrat</i>	11
Effect of different combinations of growth substances on the abscission of debladed petioles of <i>Catharanthus roseus</i> in different seasons	<i>G. Prakash</i>	24
Evolution of wood structure in Pinaceae	<i>K. K. Jain</i>	28
Factors determining the shape of citrons	<i>E. E. Goldschmidt</i>	34

TAXONOMY

Pezizales of Israel. IV. Humariaceae (B)	<i>H. Nemlich and Z. Avizohar-Hershenzon</i>	41
Pezizales of Israel. V. Ascobolaceae and Sarcoscyphaceae	<i>H. Nemlich and Z. Avizohar-Hershenzon</i>	53
Fleshy fungi of north and central Israel. II	<i>N. Binyamini</i>	62
New taxa and new combinations in <i>Flora Palaestina III</i>	<i>N. Feinbrun and I. Gruenberg-Fertig</i>	79
Taxonomic studies in <i>Centaurea</i> sect. <i>Calcitrapa</i> . III. Cytotaxonomic notes	<i>U. Plitmann</i>	84

BOOK REVIEW		90
-------------	--	----

SCIENTIFIC MEETINGS

Abstracts of papers presented at the meeting of the Botanical Society of Israel, 1975		91
---	--	----

Numbers 3-4

PAPERS DEDICATED TO A. FAHN ON THE OCCASION OF HIS 60TH BIRTHDAY

Some aspects of sieve-element structure and development in <i>Botrychium virginianum</i>	<i>R. F. Evert</i>	101
Ultrastructure of the calyx glands of <i>Plumbago capensis</i> Thunb. in relation to the process of secretion	<i>T. Rachmilevitz and D. M. Joel</i>	127
Ontogeny and distribution of myrosin cells in the shoot of <i>Sinapis alba</i> L. A light- and electron-microscope study	<i>E. Werker and J. G. Vaughan</i>	140
Comparative wood anatomy as an aid to identification of <i>Pistacia</i> L. species	<i>M. Grundwag and E. Werker</i>	152
Water movement through hydroids of a moss gametophyte	<i>E. Zamski and S. Trachtenberg</i>	168
Ultrastructure of the interaction between <i>Phytophthora infestans</i> and tuber slices of resistant and susceptible cultivars of potato (<i>Solanum tuberosum</i> L.) Orion and Majestic	<i>C. Shimony and J. Friend</i>	174

Unusual xylem differentiation below mature leaves of *Melia*

J. Benayoun and T. Sachs 184

The acropetal effect of indole acetic acid on vascular differentiation and shoot development in *Coleus blumei* Benth.

R. Aloni 195

PLANT PHYSIOLOGY

Development of plants in filtered sunlight. III. Interaction of the spectral composition of main-light periods with end-of-day red or far-red irradiations and with red night interruptions in bolting and flowering of *Hyoscyamus niger*

A. Kadman-Zahavi and E. Ephrat 203

Free amino acids in *Ophioglossum* leaves at the time of spike initiation

H. K. Goswami and S. Khandelwal 211

TAXONOMY

Astragalus camellorum Barbey, a rediscovered species from the Isthmic Desert (N Sinai)

A. Danin 214

A new *Lathyrus* from Israel: *L. hirticarpus* sp. nov.

J. Mattatia and C. C. Heyn 216

ECOLOGY

Dispersal patterns in *Erodium hirtum* Willd.

B. Zeide 221

AUTHOR INDEX

Aloni, R., 195

Altman, A., 91

Alvarez-Vega, E., 1

Arzee, T., 95, 97

Atsmon, D., 92

Avizohar-Hershenzon, Z.,
41, 53

Beer, S., 96

Benayoun, J., 184

Binyamini, N., 62

Boussiba, S., 97

Chaim, S., 94

Cohen, Y., 92

Danin, A., 214

Dayan, E., 100

Dovrat, A., 100

Dror, Z., 96

Edelman, M., 97, 98

Elberse, W. T., 93

Ellern, S. J., 93

Ephrat, E., 1, 11, 203

Epstein, E., 91

Erner, Y., 95

Evert, R. F., 101

Feinbrun, N., 79

Friedman, J., 93

Friend, J., 174

Fuchs, E., 92

Goldschmidt, E. E., 34, 92,
95

Goren, R., 95, 99

Goswami, H. K., 211

Gressel, J., 97, 98

Gruenberg-Fertig, I., 79

Grundwag, M., 152

Gur, A., 100

Halevy, A. H., 92

Heyn, C. C., 216

Itai, C., 94

Jacobsen, J. V., 94

Jacoby, B., 100

Jain, K. K., 28

Jakob, K. M., 98

Joel, D. M., 127

Kadman-Zahavi, A., 1, 11,
203

Khandelwal, S., 211

Kipnis, T., 93

Lavee, S., 91

Mattatia, J., 216

Monselise, S. P., 95, 99

Moses, R., 91

Munichor, L., 94

Naveh, Z., 94

Negbi, M., 94

Nemlich, H., 41, 53

Plitmann, U., 84

Prakash, G., 24

- | | | |
|-------------------------|-------------------------|----------------------|
| Pressman, E., 94 | Rosner, A., 98 | Vaughan, J. G., 140 |
| Rachmilevitz, T., 127 | Sachs, M., 94 | Waisel, Y., 93, 96 |
| Ratner, A., 100 | Sachs, T., 184 | Wallerstein, I., 95 |
| Reisfeld, A., 97 | Sagher, D., 98 | Werker, E., 140, 152 |
| Reuveni, M., 92 | Samish, Y. B., 93 | |
| Reuveni, O., 95 | Schwartz, M., 95 | Zamski, E., 99, 168 |
| Richmond, A. E., 96, 97 | Shimony, C., 174 | Zeide, B., 221 |
| Rikin, A., 96 | Shomer-Ilan, A., 93, 96 | Zilberstein, A., 97 |
| Rosen, D., 98 | Trachtenberg, S., 168 | Ziv, M., 99 |

SUBJECT INDEX

Abstracts of papers presented at scientific meetings which appeared in Volume 25 of the Israel Journal of Botany are not indexed herein.

- Abies*, 28–33
 abscission, growth substances, 24–27
 accumulation, myrosin, 140–151
 acropetal effect, indoleacetic acid, 195–202
 Agaricaceae, 69–70
Agaricus, 69–70
Agrocybe, 75
Ailanthus, xylem differentiation, 188
 Amanitaceae, 69
Amberboa, 83
 amino acids, free, *Ophioglossum* leaves, 211–213
 anatomy
 calyx glands, *Plumbago*, 127–139
 hydroids, moss, 168–173
 myrosin cells, *Sinapis*, 140–151
 Phytophthora-infested potato tubers, 174–183
 sieve element, *Botrychium*, 101–126
 wood, Pinaceae evolution, 28–33
 wood, *Pistacia*, 152–169
 xylem differentiation, 184–194
Anthemis, 81–82
Anthracobia, 41–44
 Ascobolaceae, Israel, 53–51
Ascobolus, 53–57
Astragalus camelorum, Sinai, 214–215
Attractylis, 83
 auxin
 petiolar abscission, 24–27
 shoot development, 195–202
 vascular differentiation, 195–202
 xylem differentiation, 184–194
 blue light, bolting and flowering, 203–210
 Bolbitiaceae, 73–75
Bolbitius, 74–75
 bolting, light effects, 203–210
 Boraginaceae, 79–80
Botrychium virginianum, sieve elements, 101–120
Bryonia, 81
 calyx glands, ultrastructure, 127–139
 cambial activity, xylem differentiation, 184–194
Catharanthus roseus, petiolar abscission, 24–27
Cathaya, 28–33
Cedrus, 28–33
Cercis siliquastrum, xylem differentiation, 184–194
Cheilymenia, 46–47
 chromatography, paper, free amino acids, 211–213
 chromosome numbers, *Centaurea* sect. *Calcitrapa*, 84–89
Chrysanthemum, xylem differentiation, 188
 citrons, shape, 34–40
Citrus medica, fruit form, 34–40
Clitocybe, 63
Coleus blumei, 195–202

- Compositae, 81–83
Conocybe, 73–74
 Coprinaceae, 70–73
Coprinus, 70–71
 Cucurbitaceae, 81
 cultivars, potato, resistant to blight, 174–183
 cytology
 calyx glands, *Plumbago*, 127–139
 hydroids, *Polytrichum*, 168–173
 myrosin cells, *Sinapis*, 146–151
 potato blight infestation, 174–183
 sieve elements, *Botrychium*, 101–126
 wood, *Pistacia*, 152–167
 cytotaxonomy, *Centaurea* sect. *Calcitrapa*, 84–89

 daylength, effect on grasses, 11–23
Delicatula, 64
 desert ecology, *Erodium* dispersal, 221–224
 development
 calyx glands, 127–139
 in filtered sunlight, 1–10, 11–23, 203–210
 myrosin cells, 140–151
 shoot, auxin, 195–202
 sieve element, 101–126
 diagnostic features, wood, *Pistacia*, 152–167
 diaspore dispersal, *Erodium hirtum*, 221–224
 differentiation
 calyx glands, 127–139
 citron fruit, 34–40
 myrosin cells, 140–151
 sieve element, 101–126
 vascular, auxin, 195–202
 xylem, 184–194
 dispersal patterns, *Erodium hirtum*, 221–224
 dry matter accumulation, in filtered sunlight, 11–23

Echinops, 82
 ecology, *Erodium hirtum*, dispersal, 221–224
 electron microscope study
 calyx glands, *Plumbago*, 127–131
 hydroids, *Polytrichum*, 108–173
 myrosin cells, *Sinapis*, 140–151
 Phytophthora-infested potato tubers, 174–183
 sieve element, *Botrychium*, 101–126
 elongation, in filtered sunlight, 11–23
Erodium hirtum, dispersal, 221–224

 evolution, wood structure, Pinaceae, 28–33

 far-red irradiation
 bolting, *Hyoscyamus*, 203–210
 effect on grasses, 11–23
 flowering, *Hyoscyamus*, 203–210
 filtered sunlight, 1–10, 11–23, 203–210
 flowering
 auxin, *Coleus*, 195–202
 grasses, filtered sunlight, 11–23
 Hyoscyamus, filtered sunlight, 203–210
 fruit development, citron, 34–40

Galium, 81
Geopyxis, 47–48
 gibberellin
 petiolar abscission, 24–27
 xylem differentiation, 184–194
Glycine max, xylem differentiation, 188
 Gomophidiaceae, 62–63
Gomophidius, 62–63
 greenhouses, plant development, 1–10, 11–23, 203–210
 growth
 citron fruit, 34–40
 in filtered sunlight, 11–23
 growth substances
 petiolar abscission, 24–27
 xylem differentiation, 184–194

 habitats
 Ascobolaceae, Israel, 53–61
 Astragalus camelorum, N Sinai, 214–215
 fleshy fungi, Israel, 62–78
 Humariaceae, Israel, 42–43
 Sarcoscyphaceae, Israel, 53–61
 heading, in filtered sunlight, 11–23
 histochemistry
 hydroids, *Polytrichum*, 168–173
 myrosin cells, *Sinapis*, 140–151
Hordeum sativum, in filtered sunlight, 11–23
 hormones
 petiolar abscission, 24–27
 xylem differentiation, 184–195
 Humariaceae, Israel, 41–52
 hybrid, *Pistacia*, 152–167
 hydroids, moss gametophytes, 168–173
Hyoscyamus niger, bolting and flowering, light effects, 203–210

- indoleacetic acid, 24–27, 195–202
 initiation, spike, *Ophioglossum*, 211–213
Iodophanus, 58
 Israel
 Ascobolaceae, 53–61
 Erodium hirtum, 221–224
 fleshy fungi, 61–78
 Flora Palaestina, 79–83
 Humariaceae, 41–52
 Lathyrus hirticarpus, 216–220
 Pezizales, 41–52, 53–61
 Pistacia, 152–167
 Sarcoscyphaceae, 53–61
 Symptetales, 79–83
 Isthmic Desert (N Sinai), *Astragalus camelorum*, 214–215

 Judean Hills, *Lathyrus hirticarpus*, 216–220

 karyology, *Centaurea* sect. *Calcitrapa*, 84–89
Keteleeria, 28–33
 key, *Pistacia*, wood anatomy, 152–167
Kickxia, 80

 Labiales, 80
Laccaria, 63
Lamprospora, 51–52
Larix, 28–33
Lathyrus, Israel, 216–220
 leaves, effect on xylem differentiation, 184–194
Lepiota, 70
 light intensity, plant development in filtered sunlight, 1–10, 11–23

Macrocyttidia, 63
Marasmius, 63–64
Matricaria, 82
Melia azederach, xylem differentiation, 184–194
Microstoma, 59–60
 morphactin, petiolar abscission, 24–27
 morphogenesis
 citron fruit shape, 34–40
 Coleus, 195–202
 xylem differentiation, 184–194
 morphology, shoot, Pinaceae, 28–33
 moss gametophyte, water movement, 168–173

Mycena, 64–68
 mycology
 Ascobolaceae, Israel, 53–61
 Humariaceae, Israel, 41–52
 fleshy fungi, North Israel, 62–78
 Phytophthora infestation, potato tubers, 174–183
 Sarcoscyphaceae, Israel, 53–61
 myrosin cells, *Sinapis*, 140–151

 new combinations, Symptetales, *Flora Palaestina*, 79–83
 new species, *Lathyrus hirticarpus*, 216–220
 new taxa, Symptetales, *Flora Palaestina*, 79–83

Octospora, 48–51
Onosma, 79–80
 ontogeny, myrosin cells, *Sinapis*, 140–145
Ophioglossum leaves, free amino acids, 211–213
Oryza sativa, in filtered sunlight, 11–23

Panaeolus, 73
 Pezizales, Israel, 41–52, 53–61
 photomorphogenesis, 11–23, 203–210
 phytochrome, 22, 203–210
 phytopathology, blight-infested potato tubers, ultrastructure, 174–183
Phytophthora infestans, potato tubers, 178–183
Picea, 28–33
 Pinaceae, wood structure, evolution, 28–33
Pinus, 28–33
Pistacia, wood anatomy, 152–167
Plectania, 60
Plumbago capensis, ultrastructure of calyx glands, 127–139
Pluteus, 69
Podonosma, 80
Polytrichum juniperinum, gametophytes, hydroids, 168–173
Populus, xylem differentiation, 188
 potato tubers, *Phytophthora* infestation, ultrastructure, 174–183
Psathyrella, 71–73
Pseudolarix, 28–33
Pseudotsuga, 28–33
Pulvina, 44–45

- Pyronema*, 57–58
Pythia cupressina, 58–59
- ray tracheids, Pinaceae, evolution, 28–33
 red irradiation
 - bolting, *Hyoscyamus*, 203–210
 - effect on grasses, 11–23
 - flowering, *Hyoscyamus*, 203–210
- resin ducts, evolution, Pinaceae, 28–33
 resin-secreting tissues, *Plumbago capensis*, 217–239
 Rhodophyllaceae, 68
Rhodophyllus, 68
 Rubiaceae, 81
 Russulaceae, 75–77
Russula, 75–77
- Salvia*, 80
Sarcoscypha, 59
 Sarcoscyphaceae, 53–61
 Scrophulariaceae, 80–81
Scutellinia, 45–46
 seasons, abscission and growth substances, 24–27
 secretion, resin, *Plumbago*, 127–139
 seed dispersal, *Erodium hirtum*, 221–224
Setaria italica, filtered sunlight, 11–23
 shoot development, auxin, 195–202
 sieve element, *Botrychium*, 101–126
 Sinai, North, *Astragalus camelorum*, 214–215
Sinapis alba, structure of myrosin cells, 140–151
Solanum tuberosum, blight infestation, ultrastructure, 174–183
Sorghum vulgare, filtered sunlight, 11–23
 spectral composition, filtered sunlight, 1–10
 - bolting, *Hyoscyamus*, 203–210
 - development, grasses, 11–23
 - flowering, *Hyoscyamus*, 203–210
- spike initiation, *Ophioglossum*, 211–213
 structure
 - calyx glands, *Plumbago*, 127–139
 - myrosin cells, *Sinapis*, 140–151
 - sieve element, 101–126
 - wood, Pinaceae, evolution, 28–33
- sunlight, filtered, plant development, 1–10, 11–23, 203–210
 Sympetalae, *Flora Palaestina*, 79–83
Symphytum, 79
- Tanacetum*, 82
 taxonomy
 - Ascobolaceae, 53–61
 - Astragalus camelorum*, 214–215
 - Centaurea* sect. *Calcitrapa*, 84–89
 - fleshy fungi, 62–78
 - Humariaceae, 41–52
 - Lathyrus hirticarpus*, 216–220
 - Pezizales*, 41–52, 53–61
 - Sarcoscyphaceae, 53–61
 - Sympetalae, 79–83
- topospory, *Erodium hirtum*, 221–224
 tracheids, ray, evolution, 28–29
 Tricholomataceae, 63–68
 trichomes, calyx, *Plumbago*, 127–139
Triticum aestivum, filtered sunlight, 11–23
Tsuga, 28–33
 tuber slices, potato, *Phytophthora infestation*, ultrastructure, 174–183
- ultrastructure,
 - calyx glands, *Plumbago*, 127–139
 - hydroids, *Polytrichum*, 168–173
 - myrosin cells, *Sinapis*, 140–151
 - Phytophthora*-infested potato tubers, 174–183
 - sieve elements, *Botrychium*, 101–126
- vascular differentiation, auxin, 195–202
 vascular system, xylem differentiation, 184–194
Verbascum, 80
Veronica, 81
 vessel differentiation, auxin, 195–202
Volvariella, 68–69
- water movement, moss gametophyte, 168–173
 wood
 - anatomy, *Pistacia*, 152–167
 - structure, Pinaceae, evolution, 28–33
- xylem differentiation
 - Coleus*, 195–202
 - Melia*, 184–194
- xylotomy, 28–33
- Zea mays*, in filtered sunlight, 11–23